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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

RAO, SHRINIVAS H

ART UNIT

PAPER NUMBER

2814

DATE MAILED: 03/13/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/802,048

Applicant(s)

HSU ET AL.

Examiner

Steven H. Rao

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 07 May 2001.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 18-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

## **DETAILED ACTION**

### ***Priority***

Receipt is acknowledged of paper submitted under 35 U.S.C. 119(a)-(d) claiming priority based on Taiwan Patent Application No. 090102333 filed February 5, 2001, which papers have been placed of record in the file.

### ***Election/Restrictions***

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 1-17 are , drawn to a method of fabricating a damascene structure, classified in class 438, subclass 645.
- II. Claims 18-20 are, drawn to a polishing slurry, classified in class 210, subclass 523.

Inventions Group I and II are related as combination and subcombination.

Inventions in this relationship are distinct if it can be shown that (1) the combination as claimed does not require the particulars of the subcombination as claimed for patentability, and (2) that the subcombination has utility by itself or in other combinations (MPEP § 806.05(c)). In the instant case, the combination as claimed does not require the particulars of the subcombination as claimed because the damascene structure as claimed in group I can be made without the use of a cleaning slurry eg. by CMP or sonic cleaning. The subcombination has separate utility such as the polishing slurry can be used to clean other structures than a damascene .

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Because these inventions are distinct for the reasons given above and the search required for Group I is not required for Group II, restriction for examination purposes as indicated is proper.

During a telephone conversation with Charles C.H. Wu on February 28, 2002 a provisional election was made with traverse to prosecute the invention of Group I, claims 1-17

. Affirmation of this election must be made by applicant in replying to this Office action.

Claims 18-20 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Applicant is advised that the reply to this requirement to be complete must include an election of the invention to be examined even though the requirement be traversed (37 CFR 1.143).

Applicant is reminded that upon the cancellation of claims to a non-elected invention, the inventorship must be amended in compliance with 37 CFR 1.48(b) if one or more of the currently named inventors is no longer an inventor of at least one claim remaining in the application. Any amendment of inventorship must be accompanied by a request under 37 CFR 1.48(b) and by the fee required under 37 CFR 1.17(i).

### ***Drawings***

This application has been filed with drawings which are acceptable .

***Specification***

The disclosure is objected to because of the following informalities:

The application/specification has not been reviewed to the extent necessary to determine all possible minor errors. Applicants' cooperation is sought to correct the errors that applicant may become aware of in the specification/ application.

Applicant s' cooperation is appreciated to correct the numerous error in specification and claims due to a translation into English from a foreign document which contains grammatical and idiomatic errors.

Appropriate correction is required.

Claims are examined by examiner as best to understood.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Farkas et al. ( U.S. Patent no. 6,001,730, hereinafter Farkas).

With respect to claims 1 and 11, Farkas describes a method of fabricating a damascene structure including the steps of : providing a substrate ( Farkas fig. 1 # 12 ,

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col. 3 lines 53-54), forming a dielectric layer on the substrate (embodiment(a) described in col. 3 line 66 to col. 4 lines 2 not shown in figures), defining the dielectric layer to form an opening to expose a portion of the substrate ( embodiment (a) not shown in figures , fig. 1 # etching 16 to form opening), forming a barrier layer conformal to the profile of the opening ( fig. 1 # 18, col. 4 lines 25-26), forming a metal layer over the substrate wherein the metal layer fills the opening and covers the dielectric ( fig.1 # 22, col.4 lines 59-60), performing a first CMP with a first slurry to remove the metal layer till barrier layer is exposed ( fig. 3 # 24 , col. 5 lines 24-60 until layer 21 is exposed) performing a second CMP process with a second slurry and a solution to remove the barrier layer wherein the solution can adjust the zeta potential ( col. 7 lines 47-50; solution adjusting zeta potential col. 7 lines 65-66 and col. 8 lines 1-10).

With respect to claims 2 and 3 wherein the solution is an oxidant selected from  $\text{KIO}_3$ ,  $\text{H}_2\text{O}_2$ ,  $\text{Fe}(\text{NO}_3)_3$  and  $\text{NH}_4\text{S}_2\text{O}_8$  (col.1 lines 56, Col. 8 line 5 and col. 7 line 39).

With respect to claim 4 wherein the oxidant is 0.1% to 5 % of the slurry. ( Col. 7 line 36- 0.01-2.0 %, therefore ).1 to 5.0 % obvious in view of the overlapping range).

With respect to claim 5, wherein the oxidant is either dissolved into the solution ( col. 7 lines 31-36) and then mixed up with the second slurry on the polishing pad from different pipelines ( col. 7 line 41-44) or added directly to the second slurry ( col. 7 line 31-36).

With respect to claim 6, wherein the low-K dielectric material organic polymers like fluorinated hydrocarbon, HSQ etc. ( col. 4 line 17-fluorinated TEOS).

With respect to claim 7, wherein the metal layer is copper, tungsten and aluminum ( col. 4 line 59).

With respect to claims 8 and 9 , wherein the pH of the second slurry is neutral (col. 7 line 52 and claims 28-29 basic-alkaline pH)

With respect to claim 10, wherein the opening can be a damascene opening, a trench for metal conductive line, a via opening for a plug, a contact opening or an opening for a damascene structure. ( col. 1 line 16-17).

Claims 12 ( repeats the steps of claim 5), 13 ( repeats the steps of claim 3), 14 ( repeats the steps of claim 4), 14 ( repeats the steps of claim 6), 15 ( repeats the steps of claim 8), 16 (repeats the steps of claim 9), 17 (repeats the steps of claim 7) and all are rejected for reasons stated above under the respective claims.


Any inquiry concerning this communication or earlier communication from the examiner should be directed to Steven H. Rao whose telephone number is (703) 306-5945. The examiner can normally be reached on Monday- Friday from approximately 7:00 a.m. to 5:30 p.m.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 308-0956. The Group facsimile number is (703) 308-7722

  
Steven H. Rao

Patent Examiner

March 01, 2002.

  
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